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3939 e.1 A guide to the exhibition galleries of the dept. of geology and palaeontology in the British Museum. 1881

A GUIDE

TO THE

EXHIBITION GALLERIES

OF THE DEPARTMENT OF

GEOLOGY AND PALÆONTOLOGY

IN THE

BRITISH MUSEUM (NATURAL HISTORY),

CROMWELL ROAD, SOUTH KENSINGTON.

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DEPARTMENT OF GEOLOGY AND PALÆONTOLOGY.

Every intelligent person must desire to know something of "the ground beneath us,"—what, for instance, is the nature of the layers of chalk and limestone, coal, sandstone, clay, or slate, which occur in the various districts of our own Island, giving to each its special features of mountain, hill or valley, plateau or plain, forest, meadow, moorland, or moss; what is their origin, and, how came they to be formed as we see them to-day. To seek out the answers to these and many other kindred questions forms the province of the Geologist.

At one time Geology and Mineralogy were associated together as one science, and rocks were only classified according to their physical characters and composition; but at the end of the last century an intelligent land surveyor, named William Smith, discovered that the several strata composing the earth's crust, might be identified all over the country by means of the fossils they contained, and that certain organisms were more or less peculiar to each. Filled with this idea, he travelled on foot through every county in England and Wales, and in 1815 he published his large Geological map, and also a work entitled "Strata identified by Organised Fossils," illustrated by fossils collected by himself. This collection of fossils, made by William Smith, is still preserved in the British Museum. From this time a new branch of study connected with Geology arose, called *Palæontology*, or the study of the ancient life-forms, whose remains lie buried as petrifactions in the rocks composing the crust of the earth. This science of Palæontology has become so very important to the

Geologist, that he no longer relies entirely on the Mineralogist in the study of rocks,* but is able to determine the age and position of any particular stratified rock by a careful examination of its fossils. Thus Mineralogy has of late become almost a separate science, which treats of the chemical composition, optical and other properties of rocks, minerals, metals and precious stones; whilst Geology investigates the origin, relation, and distribution of the strata,—especially the sedimentary formations,—the changes which our earth has undergone in past times, as regards the distribution of land and sea, and the vicissitudes of climate, evidenced by the old faunas and floras of the globe which have successively lived, flourished, and died on old land-surfaces, or in the lakes, rivers, and seas of the past, the fossil remains of which fill the cases in our Geological Galleries.

Palæontology has thus largely replaced Mineralogy as "the handmaid of Geology," and although the microscopic study of rocks (in which the sister science Mineralogy comes to the aid of the Geologist), has of late attracted a large share of attention and elicited much valuable information, yet, without doubt, the investigation of the organic remains, which the sedimentary rocks have revealed to us, will always prove more attractive to the great majority of students. Just as the antiquary, who rescues some old mosaic pavement whose myriad *tesseræ* have become ruptured and displaced by long interment in the earth, strives to unite its precious fragments and restore its pristine design for our admiration, so also the Palæontologist seeks from the fragmentary remains of a former world to rehabilitate the old animals, and show us, by the aid of comparative anatomy, what were the beings that once peopled our earth in the ages before man left any record of his existence.

So many good books on Geology have been published that it is not necessary to give in a guide-book like the present a treatise on the science, but merely to explain that the specimens in the Geological Galleries are arranged according to their zoological classes, orders, and families (so far as their true position can be ascertained), and under each is placed its name, geological position, and the locality whence it was derived, each class being grouped in descending order from the newest stratum to the very oldest. As only two of the galleries are at present open, and these are but partially arranged, visitors must not be surprised to find that many entire series of Fossil organisms cannot at present be seen. It should, however, be borne in mind, that the collection is so large, and the removal from its old home has so recently been effected, that some time must necessarily elapse before all the series can be arranged.

---

* We must still depend on the Mineralogist and Chemist for the correct determination of the igneous and metamorphic rocks, in which no traces of fossil organisms ever occur.

The Fossil Mammalia, Birds, Reptiles, and Amphibia, are all that can at present be shown. The Fossil Fishes and Cephalopoda will soon follow—the rest of the Mollusca, with Crustacea and Echinodermata, the Corals, Sponges, Foraminifera, and the Fossil Plants. Lastly, a stratigraphical series of Rocks and Fossils will be prepared. But the staff attached to the Department being very limited, it cannot speedily accomplish so large a task.

The plan facing page 27 will serve to show the general arrangement of the collections, and those who knew the old galleries, where the collections of Geology and Mineralogy were combined, will be able to form an idea of the vastly increased exhibition space which the new building affords.

The small table of Strata, page 6, is given to show the range in time of the great groups of Mammalia, Birds, Reptiles, and Fishes.

Explanatory labels and other means will be adopted to bring the objects exhibited within the comprehension of all visitors.

TABLE OF STRATIFIED ROCKS.

Period	Systems.	Formations.	Life-Periods.	
TERTIARY or CAINOZOIC.	Post Tertiary or Quaternary. (250 ft.)	Recent. Post-Pliocene.	Range of Invertebrata and Plants in time. Range of Fossil Fishes in time. Range of Fossil Reptilia in time. Footprints of Birds ?——Range of Fossil Birds in time. Range of Fossil Mammals in time.	Dominant type, Man.
	Pliocene (100 ft.)	Pliocene.		Dominant types, Birds and Mammals.
	Miocene (125 ft.)	Miocene.		
	Eocene (2,600 ft.)	Upper Eocene. Middle Eocene. Lower Eocene.		
SECONDARY or MESOZOIC.	Cretaceous. (7,000 ft.)	Maestricht Beds. Chalk. Upper Greensand. Gault. Neocomian. Wealden.		Dominant type, Reptilia.
	Jurassic. (3,000 ft.)	Purbeck Beds. Portland Beds. Kimmeridge Clay. Coral Rag. Oxford Clay. Great Oolite. Inferior Oolite. Lias.		
	Triassic. (3,000 ft.)	Rhætic. Keuper. Muschelkalk. Bunter.		Dominant type, Fishes.
PRIMARY or PALÆOZOIC.	Permian. (500 to 3,000 ft.)	Permian or Magnesian Limestone.		
	Carboniferous. (12,000 ft.)	Coal Measures. Carboniferous Limestone.		
	Devonian. (5,000 to 10,000 ft.)	Devonian. Old Red Sandstone.		
	Silurian. (3,000 to 20,000 ft.)	Upper Silurian. Lower Silurian.		Dominant type, Invertebrata.
	Cambrian. (20,000 to 30,000 ft.)	Cambrian.		
	Laurentian. (30,000 ft.)	Laurentian.		

SOUTH-EAST GALLERY.

THE Cases in the South-East Gallery are devoted to the exhibition of the Fossil remains of animals of the class MAMMALIA,* the great proportion of which are only met with in the newer Tertiary and Quaternary deposits, which form the most superficial part of the crust of the earth. The older traces of such higher class of animals are extremely rare, being met with in those rocks known to geologists as the Eocene formation;—a very few remains of almost the lowest class—the MARSUPIALIA— extremely small in size, occurring in rocks of Secondary age.† (*See* Table-case No. 14 in the Pavilion.)

Many of these animals are quite extinct, but a very large number belong to forms closely related to the existing terrestrial orders—such as the cat-tribe (lion and tiger), the dog, the wolf, the seal, the bear and hyæna, the rhinoceros, hippopotamus, pig, horse, camel, giraffe, the elephant, the deer, oxen, sheep, the beaver, marmot, hare, whales, &c.

The deposits which have yielded the largest proportion of these remains are caves and fissures in limestone rocks, old lake and river valley-basins, filled up with gravels, sands, and brick-earth; clays, shell-marls, and peat-deposits; ancient forest-beds, which have been covered up and submerged; and delta deposits formed in the estuaries of great rivers, such as the Thames, the Severn, the Rhine, the Nile, the Ganges, the Mississippi, the Amazons, and La Plata. The frozen soil of the great alluvial plains bordering the Arctic sea both in the Old and New World are rich in remains of large herbivorous animals, such as the "Mammoth" and the "Woolly Rhinoceros," that once inhabited these high northern latitudes before the climate became too cold for the growth of forest-trees.

All over the world caves are to be met with in limestone rocks. Examples of the animal remains found in some of these may be seen in Wall-case No. I. (south side). As these caves have frequently served in prehistoric times as habitations for primitive man, when he subsisted by hunting and fishing, we not infrequently meet with evidence of human occupation, as proved by the charcoal and ashes of fires, the burnt and broken fragments of the bones of animals upon which he subsisted, the rude implements of stone and bone which served as his weapons in the chase, or for domestic purposes, and even—but more rarely—rudely incised figures of the animals he saw and hunted, or the cherished ornaments he laboured to make of shells or bone to decorate his person.

---

* Animals that suckle their young; in this class is included man, and all the higher animals.

† *Hypsiprymnopsis* (represented by a single tooth), from the Rhætic beds of Somerset. *Microlestes*, from the Trias of Germany and England. *Dromatherium*, from North America. Others (small but more numerous), from the Stonesfield and Purbeck beds of England.

It often happens that the same cave has, at different periods, served as a refuge for man and for various wild-beasts—such, for instance, as the cave-lion, bear, or hyæna. Examples of remains of these animals, and of the gnawed bones of their prey, may be seen from Brixham, Kent's Cavern, Kirkdale, Gower, and other caves in England; from Bruniquel and Dordogne in France; from Gailenreuth in Franconia; and from Minas Gæras, Brazil.

In a part of this case are placed the skull and lower jaw of the "great sabre-toothed tiger" from Buenos Ayres (*Machairodus latidens*), remarkable for the enormous development of its canine teeth, and also for the extraordinary extent of its geographical distribution. Fossil remains of species of this "sabre-toothed tiger" have been met with in Kent's Cavern, Torquay, in the Norfolk Forest-bed, in the Miocene Tertiary deposits of Epplesheim in Germany, the Auvergne in France, the Val d'Arno in Italy, the Pampas deposits and the bone-caves of South America, and the Freshwater limestones, &c., of the Sewalik Hills in India. Examples of these species may be seen in the cases devoted to the Carnivora.

The *Machairodus* is now quite extinct.

Another extinct species, whose remains have also been obtained from the alluvial deposits of Buenos Ayres is the *Arctoidotherium*, an animal nearly related to the bears.

ORDER I.—BIMANA.

MAN.—In the first table-case are placed examples of the barbed harpoons made of reindeer-antler; bone needles; worked horns and bones; carved objects, and incised pictorial representations of animals from Bruniquel and from the cavern of Les Eyzies, Dordogne; also stone implements from various localities, illustrative of Prehistoric Man.

ORDER II.—QUADRUMANA.

MONKEYS.—The remains of the QUADRUMANA (four-handed animals); including at the present day the "Aye-Aye," and Lemurs, from Madagascar, and the various families of the monkey tribe (the "Catarhine,"* or Old World Monkeys, and the "Platyrhine,"† or New World Monkeys); are very rarely met with in any part of the globe in a fossil state.

The earliest trace of Old World Monkeys (Catarhina) are found in the Miocene Tertiary formations of France and Italy. Of these the fossil genus *Pliopithecus*, is related to *Semnopithecus* and to the man-like or Anthropoid apes, but its precise position is uncertain. *Dryopithecus* occurs in the Upper Miocene of St. Gaudens, France, &c. *Hylobates*, found in the Miocene Tertiary beds of Eppleshcim, was an Anthropoid, or man-like ape, of large size, with prominent pointed canine teeth. It was related to the Gibbons.

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* From Greek : *kata*, downwards ; *rhines*, nostrils ; because they have the nostrils opening downwards, as in man.

† From Greek : *platus*, broad ; *rhines*, nostrils ; because the nostrils open on the surface of the face, the nasal bones being inconspicuous in size.

The *Oreopithecus* occurs fossil in Italy, and the *Mesopithecus* described by Prof. Gaudry occurs at Pikermi, near Athens. The *Palæopithecus*, *Semnopithecus* and *Macacus* occur fossil in the Sewalik Hills of India; the latter is also found in the Pliocene of Italy, and the *Cercopithecus* in the Pliocene of France. In the case are also remains of a species of *Cebus* and of *Mycetes ursinus* from the caverns of Minas Gæras, Brazil.

ORDER III.—INSECTIVORA (MOLES, SHREW-MICE, HEDGEHOGS).

This order comprises a number of small insect-eating mammals, similar in many respects to the following order (Rodentia); but the molar teeth are always serrated with numerous small pointed eminences or cusps adapted for crushing insects. Remains of several of these little animals are found fossil in the Miocene deposits of Europe, and N. America. (Table-case 28.)

ORDER IV.—CHEIROPTERA (BATS).

The Bats are characterized by having the fingers of the fore-limbs enormously elongated and united by an expanded membrane, which also reaches to and unites the fore with the hind-limbs and the sides of the body. Some of the large tropical bats are fruit-eaters; the others are insectivorous in their diet. They are first found fossil in the Gypsum quarries of Montmartre (Upper Eocene), Paris, the species being named *Vespertilio Parisiensis*. The Vampire bat (*Phyllostoma*) is found fossil in the caves of Brazil; and *Nyctilestes* and *Nyctitherium* in the Middle Eocene deposits of North America.

ORDER V.—RODENTIA (GNAWING ANIMALS).

The Rodents—represented by the Hares, Rabbits, Porcupines, Beavers, Rats, Mice, Dormice, Squirrels, and Marmots—are characterized by having two curved chisel-shaped *incisor*, or cutting, teeth in each jaw, widely separated from the molar or grinding teeth.

There are usually two or three incisor teeth in the upper and two in the lower jaw (but sometimes there are four upper incisor teeth). These animals have no canine teeth, but they generally have four molars on each side, above and below.

The oldest rodent known is found fossil in the Eocene Tertiary formation; such animals abound at the present day. Remains of the hare (*Lepus*) are found fossil in both N. and S. America, and also in Europe.

The *Lagomys*, or tailless hare, and the Marmot (*Spermophilus*), characterize some of the Post-Glacial deposits in Britain.

The Beaver is not only most widely-spread at present, but its remains prove it to have had an equally wide distribution in the past. It was once abundant in this country, as for instance, in the valley of the Lea, near London, and in the Cambridgeshire fens. It is still found living in some of the rivers of Russia, and also in those of North America. A far larger species of beaver, called *Trogontherium*, once inhabited Norfolk, where its remains have been found in the Cromer forest-bed. A still more gigantic form, the *Castoroides Ohioensis*, is represented by a cast of the skull and lower jaw, from the Post-Tertiary of North America. A comparatively gigantic dormouse (*Myoxus melitensis*) was found in the Post-Pliocene of Malta.

These remains are placed in table-case No. 27 on the North side of the S.E. Gallery.

Near this case, in the wall-case No. XXIII., is placed the skull and lower jaw and some limb-bones of a colossal rodent-like animal, named *Toxodon*, probably larger than a horse, but having true Rodent-like teeth in its jaws. This singular and unique fossil was obtained from the Tertiary deposits of Buenos Ayres, and, with another aberrant form of Rodent, also from S. America, named *Typotherium*, prove the enormous size which some of these extinct gnawing animals attained.

ORDER VI.—CARNIVORA (Flesh-eating Animals).

In the second table-case (south side) are the remains of a large number of other carnivorous animals, chiefly from caves, representing the Hyæna and Wolf, both ancient denizens of this Island; with the Fox, Dog, Badger, Glutton, Otter, Weasel, and many other allied forms—mostly represented by skulls and lower jaws. Here are also placed the earliest representatives of these animals, the *Amphicyon*, *Simocyon*, and *Cynodictis*, occupying a third case.

The Fossil Bears fill a fourth case, whilst the carnivorous, *Hyænodon*, *Pterodon*, &c., from the lower Tertiaries of France, occupy a fifth table-case.

ORDER VII.*

ORDER VIII.—UNGULATA (Hoofed Animals).

In wall-cases Nos. II. and III. are arranged the series of remains of the fossil Rhinoceroses. These animals form the first divisions of the Order UNGULATA, or "hoofed quadrupeds;" all of which are vegetable feeders. The Rhinoceroses belong to the division which is named "uneven-toed" (*Perissodactyla*) because they all have *three toes* to the hind-feet. There is only one single living genus, which contains several species. They are huge herbivorous animals with an extremely thick skin, usually marked by deep folds; there are seven molar teeth on each side, of both the upper and lower jaw; they have no canine teeth, but there are usually incisor teeth in both jaws. The Rhinoceros has generally one or two horns, but some of the earlier extinct species were hornless. One horn was fixed on the bones of the snout (nasal bones), the other on the frontal bones. The horns have no bony centre or core, being entirely made up of longitudinal fibres, like hair, soldered together; the horns are not often preserved in a fossil state, but the surface of the nasal bones shows a roughened scar where the horn grew. To give strength to the nasal bones which support the horn when used as a weapon of offence, the division between the nostrils (usually more or less cartilaginous), was hardened by the addition of bony matter so as to form a veritable T-girder.

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* Order VII.—The Proboscidea.—*Elephants*—occupy *all* the wall and most of the table-cases on the *North side* of this Gallery from Case XIV. to Case XXIII.

The tichorhine Rhinoceros, generally known as the "woolly Rhinoceros" from having a smooth skin without folds, covered with a woolly and hairy coat, like the "Mammoth," had two horns, one very large. It has been found in frozen soil in Siberia with the skin and flesh still preserved.

Its remains have been found fossil in rocks of Newer Tertiary age all over the Old World. It was once a denizen of this country, being found in many limestone caves and also in the brick-earths of the Thames Valley, from which last named deposit several fine examples may be seen. Five species have been found fossil in this country, three of which inhabited the Valley of the Thames.

There are also placed in these cases several forms of Rhinoceros, some of which departed widely from the general type.

Following the Rhinoceros are the *Palæotheria* (animals probably related to the Tapir).

Next succeed the *Equidæ* (Horses). In all modern horses the digits are reduced to a single perfect toe on each foot; but this character does not hold good for the allied fossil forms, several of which show a tendency to an increased number of toes; but the third is nevertheless always the largest.

In wall-case IV. are arranged the remains of the "even-toed" (*Artiodactyle*) hoofed animals.

The first of this group is the *Hippopotamus*, now confined in the living state to the shores, rivers, and lakes of Africa, but once common in this country and in Europe, especially in the Southern parts, and also in India. The series comprises specimens from Malta, Sicily, the Val d'Arno, Italy, and from the Sewalik Hills, India.

Its remains have been found in the Gower Caves, S. Wales, Kent's Cave, Torquay; Kirkdale, and near Leeds, Yorkshire, the Ouse near

Bedford; and many remains have been found in tho Valley of the Thames in and around London.

The Pigs (*Suidæ*) are placed in the same wall-case as the *Hippopotami*, and in the table-case in front.

The ancestors of the pigs date back to the Eocene Tertiary. Among them may be counted the fossil genera *Chæropotamus* and *Anthracotherium; Hyopotamus*, *Anoplotherium* and *Chalicotherium*, all of which are old Eocene forms of ruminants, from the Isle of Wight and Hampshire coast, and from the Paris Basin, having wider affinities than our modern species, and affording evidence of relationship with more than one group of Artiodactyles.

In wall-case No. V. is arranged a group of fossil bones and skulls of animals belonging to the *Ruminantia*,* a division of the even-toed animals, and represented to-day by the Camel, Giraffe, etc.

The most prominent form placed in this case is the *Sivatherium*, a huge beast described by Falconer and Cautley from the Newer Tertiary deposits of the Sewalik Hills, India. It possessed two pairs of horns on its head, two short and simple in front and two larger palmated ones behind them. From the persistent character of these bony horn-cores we may certainly regard this animal as a gigantic four-horned ruminant bearing some resemblance to the living *Antelope* of India.

The fossil remains of the Camel are so closely related to the living species that they cannot readily be distinguished from them. They are found in the Sewalik Hills, India. Representatives of the South American Llamas and Alpacas are also met with in a fossil state.

Wall-case X.—*Cervidæ* (the deer tribe), the solid-horned ruminants with bare antlers† (not covered with a horny sheath supported on a bony core like the oxen) are well represented both by entire skeletons, in the centre of the Gallery, and also by a fine series of detached heads and horns of various species of the deer-tribe in and upon the wall-cases.

In addition to the Fallow Deer, the Roebuck and the Red Deer, which still linger on (*preserved* in our parks and forests), we once possessed that King of the Deer-tribe, the *Cervus* (*Megaceros*) *hibernicus*, so named from the abundance and perfect preservation of its remains met with in the shell-marls, beneath the Irish peat-bogs. An entire skeleton of the male, with antlers spreading a little over 9 feet across,‡ and of the hornless female stand in the centre of the Gallery. We also had the true elk (*Alces malchis*) and the Reindeer. Thousands of fragments of the shed antlers of the Reindeer have been obtained at Gower, South Wales, from fissures in the limestone rock. The broken skulls with the bases of antlers attached may also be seen from the cave of Bruniquel, and a fine entire antler embedded in stalagmite from Brixham Cave near Torquay.

---

* From *ruminor*, I chew the cud. A group of Hoofed Quadrupeds (Ungulata) which ruminate or chew the cud.

† The antlers of the deer tribe are shed and renewed annually, increasing in size with age, a new "snag" or tine marking each year, being added to the new antler. The horns of the oxen are never renewed, but last as long as the animal lives.

‡ Heads and horns of several others are placed on the tops of the adjacent wall-cases.

*Cavicornia** (Antelopes and Oxen).—A series of heads and other remains of old Indian Antelopes from the later Tertiaries of the Sewalik Hills, India, are arranged here. (Wall-cases VIII. & IX.)

The fossil *Bovidæ* (Oxen) are represented by a remarkable series of Indian forms, and by a fine skull and series of horn cores of the gigantic extinct ox, *Bos primigenius*, from Ilford, Essex; and of the *Bison*. But the most interesting fossil is perhaps the *Ovibos moschatus*, the "Musk-Ox," found fossil in the Valley of the Thames, and still living on the treeless barrens of Arctic America.

ORDER VII.—PROBOSCIDEA (ELEPHANTS).

The cases on the North side of this Gallery are mainly devoted to the exhibition of a very large series of fossil remains of the order PROBOSCIDEA,† represented at the present day by the Elephant alone, and in past times by the Elephant the *Mastodon*, and the *Deinotherium*. These animals have no *canine* teeth; the molar or grinding teeth are few in number, but large, and marked by ridges or tubercles. They have always two (sometimes more) incisor teeth, usually in the upper jaw, which have persistent pulp-cavities (analogous to the front teeth of the Rat and the Rabbit), which continue to grow as long as the animal lives.

In living Elephants there are two of these incisors, called "tusks," in the upper jaw, but the lower jaw is without incisor teeth.

In the *Deinotherium*, an extinct species related to the Elephants, this order is reversed, there being two tusk-like incisors in the *lower jaw*, and none in the upper.

In another extinct form, the *Mastodon*, the incisors are usually developed in the upper jaw, and form tusks as in the Elephants; but sometimes there are both upper and lower incisors, and both are tusk-like. All these animals had like the living Elephants a cylindrical trunk or proboscis (snout) with a prehensile extremity, serving to gather and convey the food to the mouth. The feet have each five toes, but some of the toes may be without hoofs.

Only two living species of Elephants are known; one, the Asiatic Elephant, confined to India, Ceylon, &c.; the other, the African Elephant, peculiar to the continent of Africa. These are well marked species, not only by their external characters, but also by their grinding teeth. These teeth in the Elephants are composed of strong enamelled plates encased in a thick setting of cement—the plates varying in number and in pattern in the different species. Thus the African Elephant has fewer plates of enamel in each tooth, which on the grinding surface are worn down to a lozenge-shaped pattern ; the Indian Elephant having many plates, closely folded together and finely crimped at their edges. The teeth of the larger number of fossil Elephants resemble those of existing species, but in some of the earlier forms they approach more nearly in character those of the *Mastodon*.

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* From *Cavus*, hollow; and *cornu*, a horn; the "hollow-horned Ruminants," in which the horn consists of a central bony "horn-core," surrounded by a horny sheath.

† Animals furnished with a flexible trunk-like snout or proboscis.

The teeth of the Elephant and Mastodon differ from those of other orders of animals, by being developed from behind forwards, and growing until the animal attains extreme old age.

The *Mastodons* were Elephants with the grinding teeth less complex in structure, and adapted for bruising coarser vegetable substances. The grinding surface of the molars, instead of being cleft into numerous thin plates, was divided into wedge-shaped transverse ridges, and the summits of these were subdivided into smaller cones, more or less resembling the teats of a cow, whence the generic name is derived.

In Wall-case XXIII., on the left hand side of the door, are placed the fossil remains of the *Deinotherium*, a hoofed quadruped of probably aquatic habits (and supposed to have been intermediate between the Tapirs and the *Mastodon*), the most perfect remains of which have been found in the Miocene Tertiary formation of Epplesheim, Hesse Darmstadt, Germany, and others in France, Switzerland, and Perim Island, Gulf of Cambay (Owen). The original skull of *Deinotherium*, described by Dr. Kaup, together with a cast of the lower jaw, are placed on a stand in the centre of the room.

The entire skeleton of the *Mastodon* from Ohio stands facing the entrance to the gallery. Immediately in front of it is placed the head and lower jaw of the South American *Mastodon* from Chili, and on the stand beneath the entire skeleton is exhibited the cast of the skull of a young individual from shell-marl beneath a peat-bog in the State of New Jersey, United States.

In Wall-cases XXI. and XXII. are arranged detached jaws, limb-bones, and other parts of the skeleton of various species of *Mastodon*. One fine lower jaw from North America has a small tusk in front, and remains of *M. angustidens* and *M. longirostris*, show clearly that this old type of proboscidean had incisor teeth in both the upper and lower jaws.

In the table-cases between are placed series of the molar teeth of various species of *Mastodon* of all ages, from the milk-teeth to the last true molars of the adult animal.

The Mastodons, when living, had a range extending from England to India, through France, Germany, Switzerland, Italy, to Armenia, India, and Ava ; they were also found both in North and South America. They numbered thirteen species. The range of the old species of Elephants was coextensive with that of its nearest relative the *Mastodon*, and embraced in addition the continent of Africa and the Northern seaboard of the Asiatic and North American continents.

One species called the "Mammoth" (*Elephas primigenius*), has been frequently found in the frozen soil of the vast alluvial plains (called "tundras,") intersected by the rivers Yenesei, Irtish, Obi, Indigirka, Lena, &c. In several instances, entire individuals have been found, so completely frozen, as to have retained the flesh and skin adhering to the skeleton; the body being covered with reddish wool and long black hair (an example of the hair and wool may be seen in case XIV.), as if to protect it from the colder climate. The tusks of this Arctic Elephant are collected for the sake of the ivory they yield; and every few years a shipload is sent from Archangel to the port of London for sale. The Siberian Mammoth agrees exactly with the specimens found fossil in various parts of England, especially at Ilford in the valley of the Thames near London, and on the coast of Norfolk.

Many of these remains may be seen in Wall-cases XIV. and XV., and in the centre of the floor is placed the fine skull, tusks, and lower jaw of the Ilford Mammoth. Similar remains have also been found beneath modern London, associated with flint implements made by early man, with whom this old elephant was contemporary.

Wall-cases XVII.—XX. India, the home of one of the two species of existing elephants, has also yielded abundant evidence of extinct species of this animal. The skull and tusks of *Elephas ganesa* (probably one of the largest of all the fossil elephants), from the Sewalik Hills in India, and exhibited next the Ilford specimen in the centre of the Gallery, has tusks which measure 10 feet 6 inches in length.* (Presented by Col. Baker.)

Dr. Falconer has described and figured thirteen species of fossil elephants, nine of which are from India, and two occur fossil in this country. For our magnificent series of skulls, tusks, and teeth of fossil Indian elephants, we are mainly indebted to Sir Proby T. Cautley, so large a donor of specimens to the Geological Department.

Before quitting the fossil elephants, attention is drawn to Table-case 20, containing the truly remarkable series of *Pigmy Elephants* from the island of Malta, collected by Rear-Admiral Spratt, R.N., F.R.S., and Prof. Leith Adams, M.D., F.R.S. These Maltese elephants, which by the form of their grinders are related to the living African elephant, were represented by one species, which only attained the size of a Shetland pony, and as we have evidence of their limb-bones, jaws and teeth, of *all ages*—even to very old age—it is fair to assume they were a distinct race or variety, probably brought about by isolation in a limited area where they may have suffered from a scanty supply of food, and so become dwarfed.

ORDER V.—CETACEA (WHALES, &c.), AND ORDER VI.—SIRENIA (MANATEE, ETC.).

A part of Wall-case XIV., and the adjoining Table-cases are devoted to the fossil remains of the aquatic mammalia of the order SIRENIA and

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* A mammoth's tusk from Eschscholtz's Bay, in the collection, measures 12 feet 6 inches along the curve.

Cetacea, represented at the present day by the Dugong and Manatee, and by the true Cetaceans, the whales and dolphins. The Sirenians are adapted for an aquatic existence; they have a powerful tail-fin placed horizontally (not vertically, as in fishes), and not supported by bony rays. The hind-limbs are almost or wholly wanting; the fore-limbs are modified to form broad swimming paddles or "flippers." In the form of the head they are not unlike the walrus-family, but they have no large tusks, and their molar teeth are adapted for crushing vegetable food—those of the *Halitherium* having a resemblance to the molars of Hippopotamus. An interesting series of the fossil remains of *Halitherium* are exhibited from the Miocene Tertiary beds of Epplesheim in Table-case 19.

The true Cetacea are more fish-like in external form than any other mammals. The nostrils (which may be single or double) are placed at the top of the head, which is generally of disproportionately large size, and is never separated from the body by any distinct external indication of any neck. This family includes the whales, the dolphins and porpoises, the sperm-whales, the ziphioid whales and the Zeuglodons. In these cases are the vertebræ, teeth and jaws of *Zeuglodon* from S. America, and of *Squalodon* from the English Crag; these animals had double-fanged teeth with conoid crowns. Parts of the hard bony rostra of *Ziphius;* the ear-bones and vertebræ of whales, &c., may also be seen in these Table-cases, many of which are from the Suffolk and Antwerp Crags, and from the phosphate beds of Charleston, S. Carolina, United States.

THE PAVILION.

ORDER VIII.—EDENTATA (Sloth and Armadillo).

Upon a stand in the centre of the floor, very near the entrance to the Pavilion, at the east end of the main Geological Gallery, is the restored cast of the body-armour of an extinct gigantic Armadillo from South America named *Glyptodon,* the separate bones of which are placed in Wall-case (XIII.) and in Table-case No. 16, whilst portions of the actual armour-plates occupy a stand on the east side of the Pavilion.

The specimen from which the cast is taken measured from the snout to the end of the armour-plated tail, following the curve of the back, 11 feet 6 inches; the tesselated body-shield being 7 feet in length and 9 feet across, following the curve at the middle of the back.

These large extinct species differ from the modern Armadillos in having no bands, or joints, in their coat of mail, which enable the living species, when attacked, to contract the body into the form of a ball. The three-banded Armadillo is only one foot in length, but the great *Glyptodon* was so ponderous and bulky that it could not be overturned, and it only needed to draw up its legs close to its body, so as to rest its carapace on the ground, and bend its armour-plated head down in front, to be perfectly protected on all sides from the attack of any enemy.

On the stand, in the centre of the pavilion, is placed the cast of the entire skeleton of the great extinct "Ground-Sloth" (*Megatherium Americanum*), the separate original bones of the skeleton, and the skull, occupying Wall-case (XIII.) and Table-case No. 15.

This colossal animal measures 18 feet in length, its bones being more massive than those of the elephant. The thigh-bone is nearly thrice the thickness of the same bone in the largest of existing elephants, the circumference being equal to the entire length. The strength of the *Megatherium* is indicated by the form of the bones, with their surfaces, ridges and crests everywhere roughened for the attachment of powerful muscles and tendons. The bony framework of the fore-part of the body is comparatively slender, but the hinder quarters display in every part enormous strength and weight combined, indicating that the animal habitually rested on its haunches and powerful tail. Whilst in that position it could freely use its strong flexible forearms and the large claws with which its fore-feet were provided to break down or uproot the trees upon the leaves and succulent branches of which it fed, like its pigmy modern representative, the existing tree-sloth, which spends it entire life climbing back-downwards among the branches of the trees.

The jaws are destitute of teeth in front but there are indications that the snout was prolonged, and more or less flexible, whilst the fore-part of the lower jaw is much prolonged and grooved to give support to a long cylindrical, powerful, muscular tongue, aided by which the great sloth, like the giraffe, could strip off the small branches of the trees which, by its colossal strength, it had uprooted.

In the Elephants, which subsist on similar food to that of the *Megatherium*—the grinding of the food is effected by molar teeth which are replaced by successional ones as the old are worn away. In the Giant Ground Sloth only one set of teeth were provided, but these by constant upward growth, and continual addition of new matter beneath, lasted as long as the animal lived and never needed renewal.

Remains of other allied animals namely the *Mylodon*, the *Scelidotherium* and the *Megalonyx* may be seen in Table-cases 16 and 17.

Although so much larger in bulk than their modern representative, these huge extinct vegetarians of the New World all belong to one family, being classed with the "Great Ant-eaters" in the order EDENTATA (or toothless animals), but the ant-eaters are the only ones in the class that have no teeth, the others having teeth in the sides of their jaws but none in front.

At the time these animals lived the larger part of the vast grassy plains of La Plata, watered by the Rivers Parana, Uruguay and Negro, (forming the Argentine, Uruguayan and Paraguayan Republics) having an area of more than 900,000 square miles, were probably covered with virgin forests, like those of the Valley of the Amazonas, whose boughs afforded abundant foliage upon which these great ground-sloths might browse, whilst the herbage, roots (and perhaps insects and carrion) satisfied the needs of the sluggish and unwieldly *Glyptodon*. The remains of these curious animals are found buried beneath the surface in the alluvial soil which forms the "pampas," or grass-lands of this wide, level, and treeless tract of South America.

ORDER IX.—MARSUPIALIA (KANGAROO AND WOMBAT.)

Just as the South American Continent had, in past ages, its peculiar group of colossal animals (EDENTATA), represented at the present day by the little banded "Armadillo" and the "Tree-Sloth," so the great Island-Continent of Australia had formerly its peculiar indigenous fauna, which lived, flourished and died, probably before this vast region of the earth had been visited by the human race. Wall-case XI. and Table-cases Nos. 13 & 14, contain the remains of these large extinct animals belonging to the class MARSUPIALIA—so called because some of them (*e.g.* the Kangaroos,) were furnished with a *Marsupium* or pouch in which to carry their young after birth until they were able to care for themselves;—represented at the present day by the Kangaroos.

The largest of this ancient family is called *Diprotodon* (Owen); the skull alone measures three feet in length, being six times as large as the great red kangaroo (*Macropus major*) its living representative. The fore-limbs were longer and the hind-limbs shorter in proportion than in the living kangaroo, and its skeleton was altogether more robust.

Other forms have been named by Professor Owen, *Sthenurus*, *Protemnodon*, and *Nototherium*.

Of the Wombat family only a small living representative is known, of burrowing habits, found in Tasmania; formerly they were abundant on the continent of Australia, varying in size from that of a marmot to that of a tapir. The largest of these are named *Phascolomys magnus* and *P. gigas*. All these animals were herbivorous, subsisting on grass and roots; but one form, remarkably modified from the rest, yet nevertheless of the same marsupial class, was a true carnivore (according to Professor Owen) and preyed upon these old giant kangaroos and wombats. It has been named *Thylacoleo carnifex*.

All the indigenous animals found in Australia both in the past and also at the present day had peculiar modifications of their skeletons characteristic of the class *Marsupialia*, and none are found out of that region of the globe save a single small family called "Opossums" or *Didelphidæ*, found in America. These little animals, with a small banded ant-eater (*Myrmecobius*); the Bandicoot (*Perameles*); the Tasmanian devil (*Dasyurus*); and the Tasmanian wolf (*Thylacinus*); are all insect eaters or prey upon animals smaller than themselves.

As far back in time as when the Purbeck and Stonesfield rocks were formed some of these small marsupial animals must have lived in this country, as a series of minute fossil jaws and teeth found embedded in these formations proves. The fossil jaws of these little animals (no bigger than those of a rat or a mouse) may be seen in Table-case No. 14, together with others of a similar class from Brazil.

Most of the remarkable series of remains from Australia were obtained from lacustrine and river deposits on Darling Downs, Queensland, associated with estuarine shells of the genus *Melania*, and from the Wellington Caves, New South Wales.

CLASS AVES.—(Birds.)

It had generally been accepted that the most ancient type of birds known were the great wingless running birds, such as the Ostrich, Rhea, Emeu, Cassowary, and Apteryx, and no doubt these may have a very high antiquity, but the oldest bird remain at present discovered is to be seen in the central case on the north side of this room and named *Archæopteryx macrura.* (Owen.) This remarkable long-tailed bird was obtained from the lithographic stone quarries of Solenhofen in Bavaria, a rock of the Oolitic formation. The stone is so fine-grained that besides the bones of the wings, the furculum, or "merry thought," the pelvis, the legs and the tail we have actually casts or impressions on the stone (made when it was as yet only soft mud) of all the feathers of the wings and of the tail. The leg-bone and foot are like that of a modern bird, but the tail is elongated like that of a rat, or of a lizard, with a pair of feathers springing from each joint, a character not to be found in any living bird. Quite recently another example has been obtained from the same locality and is now preserved in the Berlin Museum. A photograph of this is placed beside the original fossil.

In the same case are placed portions of the leg-bones and two eggs of an extinct wingless bird, named *Æpyornis* (probably larger than an Ostrich), found in a very modern formation in the Island of Madagascar. The egg of this bird measures 3 feet in its longest circumference and 2 feet 6 inches in girth. Its liquid contents equal a little more than 2 gallons. They are much larger in size than the eggs of *Dinornis*, which are placed beside them in the case.

The rest of the case is occupied with remains of the great extinct wingless bird the "Moa," or *Dinornis*, from the Island of New Zealand, and the *Dromiornis* from Australia.

Judging from the vast number of remains of this bird, found both in the middle and north Island, and also from the fact of the extraordinary diversity in size which their remains exhibit—it must have enjoyed for hundreds of years complete immunity from the attacks both of man and wild beasts.

The ancient Maoris, when they landed, no doubt feasted on these huge birds as long as any remained, and their extermination probably only dates back to a little before these Islands were thrice visited by Captain Cook, 1769–1778. Their charred bones and egg-shells have been noticed by the Honourable Walter Mantell, mixed with charcoal where the native ovens and fires were formerly made; and their eggs are said to have been found in Maori graves.

Three nearly entire skeletons of *Dinornis* are placed in cases against the wall of this room, the tallest being 12 feet in height and the smallest only 3 feet.

Other interesting birds (now exterminated) once inhabited these Islands at the Antipodes, but they are not as yet exhibited in this room.

GALLERY "D." REPTILIA.

Quitting the S.E. Gallery, near its eastern end, we pass by a passage into Gallery "D," which runs parallel with the former on its northern side.

This Gallery is devoted to the exhibition of the remains of fossil Reptilia, a class which includes the Tortoises and Turtles, Snakes, Lizards, Crocodiles, and a large number of extinct forms, the exact zoological position of many of which we can only judge by analogy. Like the Mammalia, the Reptilian class lived both on land and in the water; some, being evidently fitted for terrestrial locomotion, by their well-developed legs; others, as shown by their paddle-shaped limb-bones, must have passed their entire existence in the water. One group, now extinct, possessed, like the Bats and the Birds, the power of flight.

In Case (1) will be placed the fossil remains of this last-named group of "Flying Lizards" or Pterodactyles. These animals had the centra of the vertebræ hollow in front; they possessed a broad *sternum* or "breast-bone," with a median ridge or keel, similar to that of birds; the jaws were usually armed with teeth fixed in sockets.* The fore-limb had a short humerus, a long radius and ulna, and one of the fingers of the hand was enormously elongated to give support to the wing-membrane, which was attached to the sides of the body, arm and hand, and possibly also to the hind-limb and tail, which in some genera (as in *Rhamphorhynchus*) was greatly elongated and stiffened with slender ossified fibres. The other fingers of the hand were free and furnished with claws. The wing-membrane probably resembled that of the Bat, being destitute of feathers. The bones were pneumatic (*i.e.* filled with large air-cavities), the walls of the bones being very thin and compact, thus combining strength and lightness.

Numerous remains of nearly perfect Pterodactyles, both with long and short tails, and varying greatly in size, have been obtained from the Solenhofen Limestone in Bavaria—others occur in the Great Oolite at Stonesfield, near Oxford; and in the Lias formation, Lyme Regis, Dorset; the most remarkable of these English examples is the *Dimorphodon macronyx* from the last named locality, which had a large head, the jaws armed with lancet-shaped teeth, a long tail and well-developed wings. The skull was 8 inches in length and the expanse of the wings about four feet. (Owen.)

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* A remarkable genus of Pterodactyles has just been discovered and described by Prof. Marsh in North America, and named *Pteranodon*; they were wholly destitute of teeth and probably had their jaws encased in horny beaks like birds.

The Flying Lizards obtained from the Chalk and Greensand give evidence of creatures of far larger size—but their remains are all very fragmentary. For example, some detached vertebræ of the neck of one species have been found in the Cambridge Greensand, measuring 2 inches in length, and portions of humeri 3 inches broad. Such bones give evidence of a flying lizard having probably an expanse of wings, of from 18 to 20 feet. The Pterodactyles of the Chalk of Kent were nearly if not quite as large (Owen). These singular flying reptiles do not appear to have lived longer than the period of time represented for the deposition of the strata from the Lias formation to the Chalk. They are now entirely extinct.

In this case (1) are also placed the remains of the great aquatic Lizard-like reptile which once inhabited the shores of the sea in which the Uppermost Chalk and the Maestricht beds were deposited and known as the *Mosasaurus*, whose powerful jaws, armed with great grooved, recurved conical teeth, have been obtained from St. Peter's Mount, near Maestricht, and (under the name of *Leiodon*) from the Chalk of Norfolk and Kent. Remains of over forty species of this tribe have been found in the Cretaceous rocks of New Jersey, Kansas, &c., in North America. One of these, the *Mosasaurus princeps*, is computed to have been seventy-five to eighty feet long. The body was covered with small overlapping bony plates. The paddles which were four in number, each with five digits, had a remarkable resemblance to the "flippers" of a whale.

Here are also placed the remains of a great extinct land-lizard (*Megalania prisca*, Owen) from Australia, fourteen feet, or even more, in length, with nine horn-like prominences on its skull, which measured 1 foot 10½ inches in breadth. The skull, at first glance, looks like that of some flat-headed form of Ox; but the bones are altogether dissimilar, and the jaws are without teeth. It was probably a vegetable feeder, like its living representative (*Moloch horridus*), also from Australia, which has horns on its skull, but the entire length of which is only 7 inches.

Since the two papers by Professor Owen (Phil. Trans. for 1858 and 1880) on this curious and huge lizard have appeared, a further portion of its remains have been sent over, showing that it possessed a tail encased in a horny sheath, so like the armour-plated tail of the great extinct non-banded Armadillo (*Glyptodon*) from South America; that had the tail arrived before the head and vertebræ had been received, it might well have been cited to prove the former existence of the *Glyptodon* in Australia.

OPHIDIA (Serpents), these are rarely met with in a fossil state, but a few such remains have been obtained from the Tertiary rocks, one of these the *Palæophis toliapicus* has been obtained from the London Clay of Sheppey; others are recorded from the Miocene of Œningen.

The CROCODILIA (Case 2) had the body covered with a thick layer of oblong bony plates or scutes, pitted on the surface, and covered with a horny substance. They have a single row of teeth in distinct sockets, which are continually being renewed from below; the joints of the backbone in these reptiles are either cup-shaped or concave at both ends, as in *Teleosaurus;* or concave in front and convex behind, as in the Crocodile from Sheppey, and in all living Crocodiles. Professor Owen has constituted two groups, based on these modifications of the backbone. Of the earliest of these Crocodilian reptiles one is named *Belodon*, having long and pointed slightly-curved teeth, longitudinally grooved, and with elongated jaws like the modern Gavials: the other, named *Stagonolepis*, resembled the existing Caimans, but with an elongated skull like the Gavials; the body was covered by bony scutes. Both these reptiles are from the Trias, the latter from Elgin, Scotland; the former from Stuttgardt, Germany. In the Oolitic and Liassic series the old type of long and slender-jawed Teleosaurs and Steneosaurs with strong bony scutes was abundantly represented.

From the Purbeck beds of Dorset we have a true Crocodilian, the *Goniopholis;* and a dwarf species, named *Theriosuchus pusillus* by Prof. Owen.

A large Crocodile has been obtained from the Eocene Tertiary of the Isle of Wight and Hordwell, Hampshire; and remains of many species of Alligators, Crocodiles and Gavials, from the Tertiary rocks of India, may be seen in this case.

Cases (3) and (4) DEINOSAURIA.—This remarkable group of huge terrestrial reptiles is quite extinct. In some of them there appear to have been bony dorsal plates and spines present, others were without such defences. Most of these animals had flat or biconcave centra to their vertebræ, a few of the anterior vertebræ had hollow cups behind. Two pairs of limbs were always present, furnished with strong-clawed digits.

They were probably to some extent amphibious in their habits, but their limbs were well-fitted for progression on the land.

The skeleton of a small Dinosaurian reptile, of which a beautiful cast may be seen in the case; the original being preserved at Munich, named *Compsognathus longipes*, has been found entire in the Lithographic stone of Solenhofen, and from the relative proportions of its limbs we cannot but conclude that it must have "hopped, or walked in an erect or semi-erect position,* after the manner of a bird, to which its long neck, slight head, and small anterior limbs must have given it an extraordinary resemblance" (Huxley).

"Mantell's *Iguanodon*." The slab in the centre of Case (3) contains a great portion of the skeleton of a young individual of *Iguanodon Mantelli* from Bensted's Kentish Rag quarry at Maidstone. This is one of the largest of the great extinct land-reptiles, some of which certainly rivalled the elephant in bulk.*

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* Like a Jerboa.

The femur (thigh bone) alone measured 4 to 5 feet in length. The fore-limbs were very short, so that it is almost certain that it did not make use of them for progression on the ground, but supported itself habitually in an upright position by the aid of its long and powerful tail, after the manner of a kangaroo.

This great reptile was a vegetarian in its diet, as is proved by its teeth, which correspond with those of the living and vegetable-feeding *Iguana* of S. America.

Their fossil teeth are not unfrequently found worn down at the crown, like the grinders of an elephant.

They were implanted in distinct sockets, and a succession of teeth always growing up from beneath, replaced the worn-down stumps. The teeth are curved and leaf-shaped in form, and the edges are elegantly serrated, a character peculiar to all the vegetable-feeding Dinosaurs, such as *Acanthopholis*, *Scelidosaurus*, and the South African genera, *Anthodon* and *Nythosaurus.*

Case (4). In the centre of Case (4) is placed the great block of septarium from the Kimmeridge clay of Swindon, Wilts, containing the femur, pelvis, and a large portion of the skeleton of another huge *Dinosaur*,† named *Omosaurus armatus* by Prof. Owen.

The femur is over 4 feet in length, and the humerus nearly 3 feet and enormously broad. Many bones and vetebræ of *Omosaurus* were found in the clay near the chief mass.

Numerous other fine Dinosaurian remains are to be seen in these cases. As we do not know the teeth of many of these huge reptiles, we are unable to speak positively as to their habits; but it is certain that from the Trias to the Chalk two groups have existed, side by side, one having a carnivorous dentition, and the other being herbivorous. The *Teratosaurus* of the Trias of Stuttgardt and the *Lycosaurus* and *Cynodraco* from the Cape; the *Megalosaurus* of the Stonesfield Slate and Wealden were all carnivores. But of *Polacanthus*, *Omosaurus*, *Hylæosaurus*, and *Cetiosaurus* we have no direct dental evidence. No doubt, as amongst the Mammalia at the present day, the majority were vegetable feeders, and the minority were predaceous in habit.

In Case (5) are placed the series of remains of reptilia from the Trias of S. Africa referred by Prof. Owen to the genera *Lycosaurus*, *Ptychognathus*, *Oudenodon*, and *Endothiodon.*

Cases (6 and 7), CHELONIA.—In the order CHELONIA are included Tortoises and Turtles, a group of reptiles in which the true internal skeleton is combined with the external coat of bony plates, closely soldered together, enclosing the entire body of the animal. This box-like envelope is covered with leathery skin or horny plates; one kind of which is called "tortoise shell," and is made into combs, &c. The backbone is soldered together, and the ribs are greatly expanded and united immovably. The bones of the skull (except the lower jaw and the hyoid bones) are also consolidated. They have no teeth, but the jaws being encased in a horny beak, the sharp edge serves instead for dividing the food.

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* Quite a number, eight or ten, of these huge reptilia were recently obtained from the Cretaceous of Belgium, and an almost complete skeleton has been put together in the Brussels Museum, proving it to have been more than 30 feet in length.

† This specimen forms a lasting monument to the rare scientific ability of Mr. William Davies, F.G.S., Assistant in the Department of Geology, under whose direction it was exhumed, and was, with the aid of the skilful mason, Mr. Barlow, developed from its shapeless and intractable matrix.

The Chelonians are found living at the present day on land, in fresh water, and in the sea; they are all oviparous, depositing their eggs in the sand, to be hatched by the warmth of the sun.

Some of the old gigantic land-tortoises (of which a few only survive) inhabited Mauritius and other islands of the Indian Ocean and the Galapagos Islands in the Pacific. Like the Dodo, they have been gradually exterminated by the hand of man. The largest of the fossil forms (a restored cast of which is placed on a stand at the west-end of this gallery) is the *Colossochelys atlas* from the Sewalik Hills of India. The detached fragments (*vouchers* for the size of this great carapace) are placed in the adjacent case (7). These old land-tortoises, so remarkable for the size to which they attained, had extremely long necks and small heads; they were all vegetable feeders and quite harmless.

Several smaller species of Chelonians are also to be seen in this case from the same Indian locality.

In Case 6 are placed the remains of the great *Chelone Hofmanni* from the Chalk of Maestricht.

The great *Chelone gigas*, Owen, whose head and some other parts are preserved here, obtained from the London clay of Sheppey, was even larger. These were true marine turtles, related to the "Loggerhead" Turtle of the present day.

One small species of *Emys*, or Marsh Tortoise, was formerly an inhabitant of this country, and its remains have been found fossil in Norfolk.

The oldest Chelonians we know are found fossil in the Great Oolite formation, but judging from certain footprints in the Triassic sandstones, they may have existed at even an earlier date.

In Case 10 are placed the remains of one of our largest marine reptiles, the *Pliosaurus*, found fossil in the Kimmeridge clay near Ely, and also in Dorsetshire. We have no entire skeleton of this animal, but a single swimming-paddle measured 7 feet in length; its jaw was 6 feet long, and one of its teeth was 15 inches in length. It had a shorter neck than the *Plesiosaurus*, but was probably less fish-like in aspect than *Ichthyosaurus*, which latter reptile it outrivalled in point of size.

In Case 11 are arranged the extinct groups of marine reptiles, the PLESIOSAURIA. They are distinguished at once by the great development of the neck, which is composed of numerous vertebræ. The head is comparatively small in size; the orbits were large; the limbs were shaped externally like the flippers of a whale, and made up of

5 fingers, composed of numerous phalanges. The jaws were armed with many simple pointed teeth inserted in distinct sockets. The most complete examples are the *Plesiosaurus Hawkinsii*, [illegible]0″ × 3′ 0″; the *Plesiosaurus robustus*, 13′ 0″ × 6′ 0″; the *Pl. laticeps*, 14′ 0″ × 5′ 6″, all in Case 11; and the cast of the great *Pl. Cramptoni* (on the wall of the passage leading to the S.E. gallery), which is 22′ 0″ in length and 14′ 0″ in breadth measuring across its expanded paddles.

Most of these were obtained from Street in Somersetshire and from the Lias of Lyme Regis, Dorsetshire, and Whitby, in Yorkshire.

Case 12, ICHTHYOSAURIA, "Fish-Lizards."—These great marine reptiles had very short necks (probably not visible at all externally); the vertebræ were numerous and deeply biconcave; the skull had very large orbits, and the eyes were surrounded by a ring of broad bony (sclerotic) plates. The jaws were elongated, and armed with powerful teeth implanted in distinct sockets. The fore and hind limbs were converted into fin-like organs, composed of short polygonal bones, arranged in five closely approximated rows, with supernumerary rows of marginal ossicles added.

The largest entire *Ichthyosaurus* is from Lyme Regis, and measures 22 feet in length and 8 feet across the expanded paddles.

In some of the Ichthyosaurs the jaws are prolonged into a long and slender rostrum; others have short and robust heads, and jaws armed with large teeth.

These old marine lizards must have exercised the same repressive action over the teeming animal population of the old Liassic seas that the sharks do in our seas at the present day. Their distribution is similar to that of *Plesiosaurus*.

Case 8. In this case is arranged a further series of S. African reptilia belonging to the division, ANOMODONTIA (Owen), such as *Dicynodon*, &c.

Case 9, AMPHIBIA (Frogs, Toads, Newts, and Salamanders).—These animals are distinguished from true reptiles by the fact that the young undergo some sort of metamorphosis after leaving the egg. In this state of their existence they breathe by external gills, and sometimes these gills are retained along with internal lungs in the adult animal. The limbs are sometimes all absent, or one pair may be wanting. When present, they have the same bones as in the higher animals; they are never converted into fins. There are never more than two vertebræ coalesced to form the sacrum. The centrum of the backbone is sometimes found to be unossified, forming a mere ring of bone, the interior being gelatinous. This form of backbone is called "Notochordal," and is characteristic of the oldest reptilia belonging to this group met with fossil in the Coal Measures, such as the *Anthracosaurus*, *Achægosaurus*, and the Triassic *Labyrinthodon*.

The Salamanders are represented by the great fossil form from the Miocene of Œningen, which, when first discovered, in 1726, was described by Scheuchzer as "*homo diluvii testis*," the man who witnessed the Deluge!

The tail-less *Batrachia* (frogs) have been found fossil in the same freshwater deposit, and also in the Brown Coal of Bonn-on-the-Rhine.

GALLERIES RUNNING NORTH OUT OF THE REPTILIAN GALLERY (D).

There are three large exhibition-Galleries running at right-angles from Gallery D. (Reptilia).

Gallery A. (This Gallery is *not yet ready for occupation*). It will contain, on its *Western* side, the Collection of Fossil FISHES.

On the *Eastern* side will be placed the fossil CEPHALOPODA (Squids, Cuttlefishes, Pearly Nautilus, Ammonites, Orthoceras, &c.).

Gallery B. (This Gallery is *now under arrangement*), the *Western* side will be devoted to the exhibition of the Fossil Mollusca, Land and Sea Snails, Whelks; Oysters, Mussels, Pectens, &c.

On the *Eastern* side, the Lamp-shells (Brachiopoda), the Sea-mats (Bryozoa); the fossil Insects, Myriapods, and Scorpions, &c.; the Crustacea (Crabs, Lobsters, Shrimps; Barnacles; King Crabs; Trilobites, &c.); the Echinodermata (Sea-urchins, Star-fishes, Stone Lilies, Brittle-stars, &c.).

Gallery C. (This Gallery is *not yet provided with wall-cases.*) In it on the *Western* side, will be arranged the Fossil Corals; the *Graptolites;* the Foraminifera; and the Fossil Sponges.

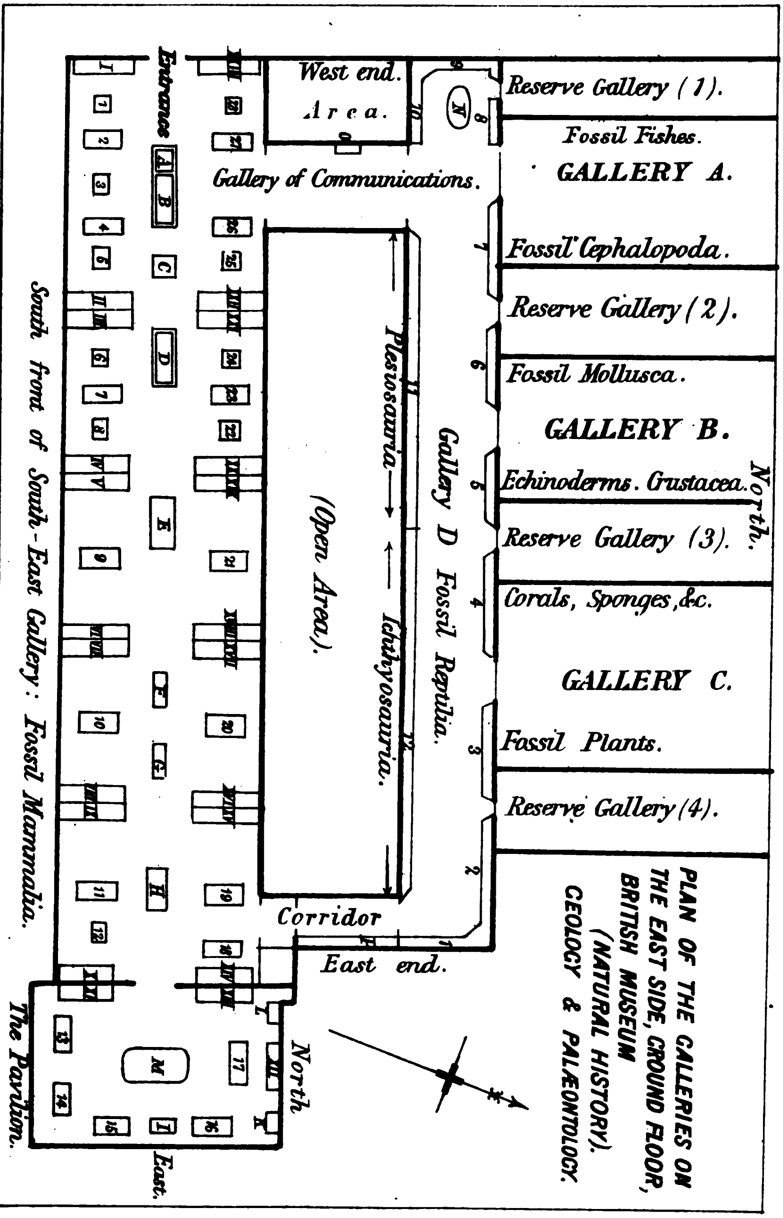
On the *Eastern* side will be exhibited the Fossil Plants.

There are also four narrow "Reserve-Galleries" for Books and Study-Collections, and for the arranging of specimens.

It is intended to fit up in one of these a series of Geographical and typical Collections; and in another a special Stratigraphical series.

As these Northern Galleries are completed they will each in succession be thrown open to the public, and a brief description of their contents will be added to this Guide.

HENRY WOODWARD.



PLAN OF THE GALLERIES ON THE EAST SIDE, GROUND FLOOR, BRITISH MUSEUM (NATURAL HISTORY). GEOLOGY & PALÆONTOLOGY.

DANGERFIELD. LITH. 22. BEDFORD ST. COVENT GARDEN.

EXPLANATION OF PLAN.

LIST OF LARGE OBJECTS, PLACED ON SEPARATE STANDS, MARKED BY LETTERS UPON PLAN.

S.-E. GALLERY.

A. Skull of *Mastodon Andium;* from Chile, South America.
B. Entire skeleton of *Mastodon Ohioticus;* Kentucky, and skull of young *Mastodon* on same stand, from New Jersey.
C. Skull and lower jaw of *Deinotherium giganteum,* from the Miocene of Epplesheim, Hesse Darmstadt.
D. Skull of *Elephas ganesa;* from the Miocene, Sewalik Hills.
E. Skull and lower jaw of *Elephas primigenius,* from the Pleistocene Brick-earth, Valley of the Thames, Ilford, Essex.
F. Male skeleton, with antlers, of the gigantic Irish deer *Cervus* (*Megaceros*) *hibernicus* from Armagh, Ireland.
G. Female (hornless) skeleton of same.
H. Plaster-cast restoration of *Glyptodon,* from the Pleistocene deposits of Buenos Ayres, South America.

PAVILION.

I. Parts of two original carapaces of *Glyptodon.*
M. Restored cast from actual bones of skeleton of the "gigantic Ground Sloth" *Megatherium,* from Buenos Ayres.
K. Skeleton of the Elephant-footed Moa (*Dinornis elephantopus*), from New Zealand.
L. Skeleton of *Dinornis maximus,* the largest Moa from New Zealand, and of *Dinornis minor,* the smallest of wingless Running birds (save the *Apteryx*).

CORRIDOR. ?

P. Plaster-cast of the great *Plesiosaurus Cramptoni,* the original from the Lias (Alum shale) of Whitby, Yorkshire.

GALLERY D.

N. Plaster-cast model of Carapace of the gigantic land-Tortoise from the Sewalik Hills, *Colossochelys gigas,* Falconer.
O. The human skeleton from Guadeloupe, presented by Admiral Cochrane, R.N.

The small numbers mark the Table-cases and the Roman numerals the Wall-cases.

BRITISH MUSEUM (NATURAL HISTORY).

DAYS AND HOURS OF ADMISSION.

Exhibition Galleries are Open to the Public, free, every day of the week, except Sunday, in

January and February,	from 10 A.M. till 4 P.M.
March and April,	„ „ „ „ 5 „
May to August,	„ „ „ „ 6 „
September and October,	„ „ „ „ 5 „
November and December,	„ „ „ „ 4 „

May 1st, to the middle of July, on Monday and Saturday only, till 8 P.M.

July (middle), to end of August, on Monday and Saturday only, till 7 P.M.

The Museum is Closed as follows:—

On Good-Friday, Christmas-Day, and on days of Public Fast or Thanksgiving.

EDWARD A. BOND,
Principal Librarian.

April 18th, 1881.